DRIVER

OCTOBER 1974

city driving

freeway driving

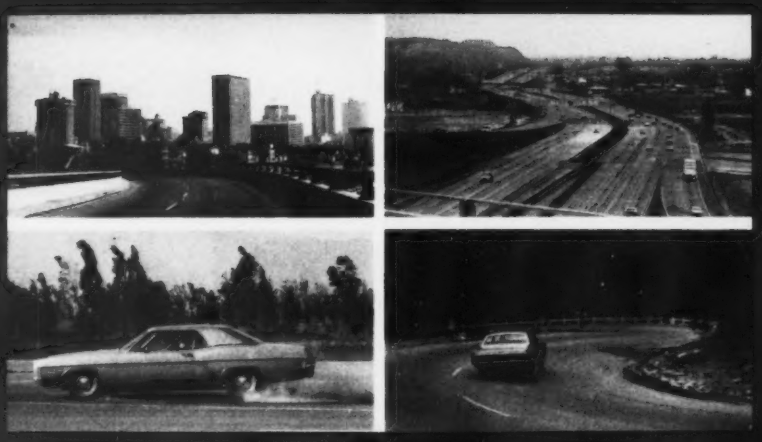
braking

curves

reviewing

THE BASICS

DRIVER



reviewing the BASICS

Driving can be a lot like golf.
After you've been doing it for a while, you can pick up some bad habits and not know what they are. The golfer will go back to the pro for a lesson or two to find out what he's doing wrong and correct it.
But sometimes the driver goes merrily along, never realizing that he's gotten into some dangerous habits.

So, whether you've been driving two months or 20 years, how about spending a few minutes thinking about the basics and honestly evaluating your own habits?

city driving

Some people seem to have a "thing" about driving in a city. They are apprehensive about it, and their driving shows it.

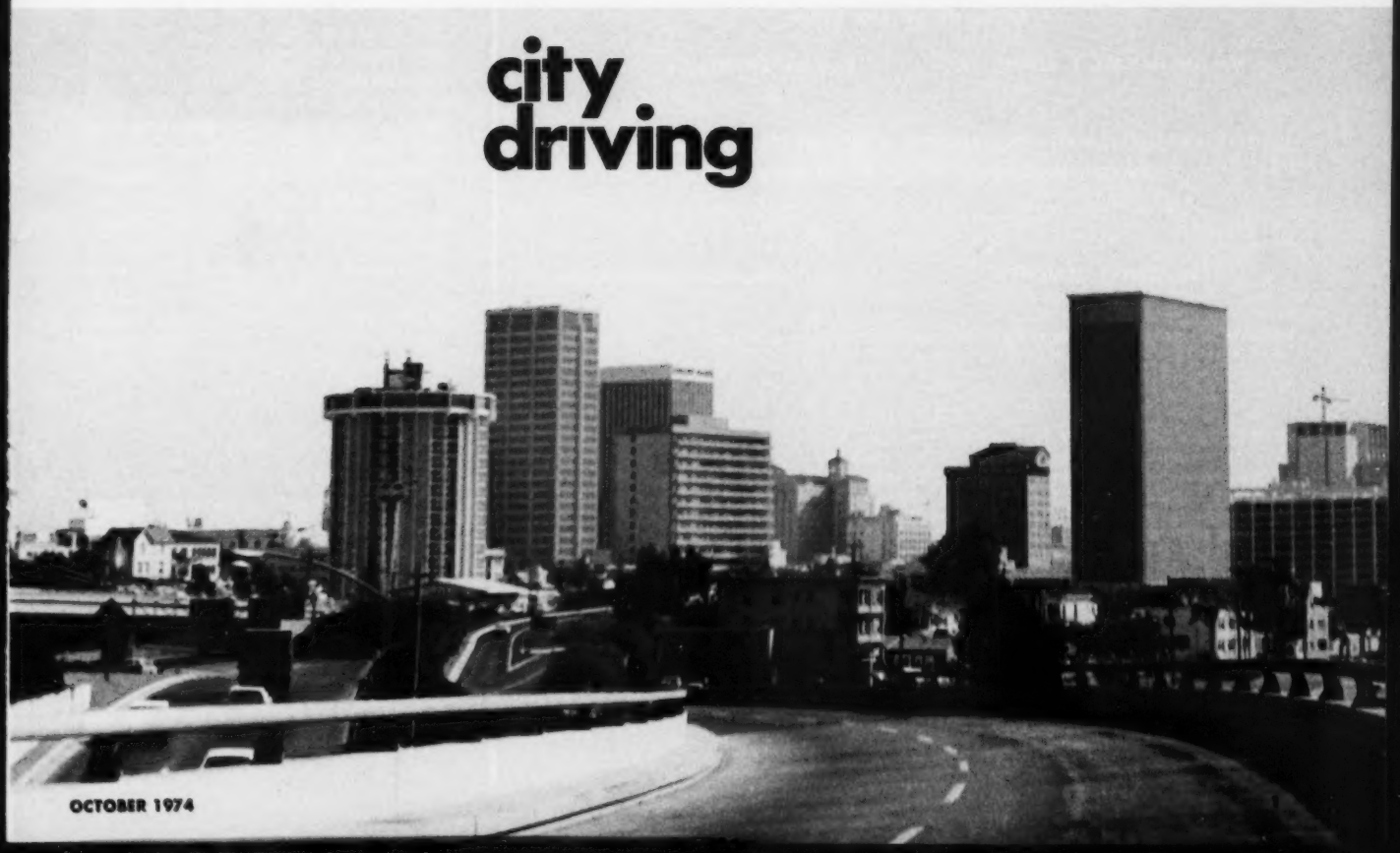
City driving can be challenging, with more traffic, distractions, street signs and directional information, traffic lights, pedestrians, cyclists, torn-up streets, rush hour congestion, not to mention the occasional parade. But keep in mind that throughout the country, at this very moment, millions of people are driving in cities and getting along quite well. It's a normal way of life, and drivers who put city driving in the proper perspective find it is no problem.

A reasonably competent driver should be able to take city driving in stride, but there are a few facts to know.

Whether you are in home territory or an unfamiliar city, know the best way to get to where you are going. Don't drive around aimlessly trying to pick out a familiar street or landmark. Don't hesitate to obtain a city map and plan your trip into unknown territory, just as you would for a cross-country trip. If you must ask for directions, pull out of the traffic flow and into a parking area or service station and ask directions. Don't sit in your car at a stop light and holler over to other motorists or passers-by for information or directions.

When possible, take advantage of the urban sections of freeways that rim and/or crisscross most large cities. Become familiar with these higher speed arteries. You'll save time and energy. But know in advance where to enter them and where to exit.

continued



DRIVER

THE TRAFFIC SAFETY MAGAZINE FOR THE MILITARY DRIVER

OCTOBER 1974

VOLUME 8 NUMBER 5

CONTENTS

FEATURES

Reviewing the Basics 1
Driving Missiles 8
The Cyclist's Friend In D.C. 14

DEPARTMENTS

Double Clutch 2
Miss DRIVER 13
Behind the Handlebars 20
The Backyard Mechanic 22
Backfire 26
Tuneup 29
What Should You Do? ..... Back Cover

DEPARTMENT OF THE AIR FORCE · HQ AIR FORCE INSPECTION AND SAFETY CENTER
Norton Air Force Base, California 92409

Lt Gen DONALD G. NUNN
The Inspector General, USAF

Maj Gen RANALD T. ADAMS, Jr
Commander, Air Force Inspection and Safety Center

Brig Gen CHARLES E. YEAGER
Director of Aerospace Safety

PUBLISHED IN COOPERATION WITH THE DEPARTMENT OF THE ARMY AND THE DEPARTMENT OF THE NAVY

Dr. FRANCIS S. McGLADE
Director of Safety
United States Army

RADM RICHARD E. RUMBLE
Commander,
Naval Safety Center

Maj GARY I. SEMONES
Chief, Safety Education Division

Capt. TOBIAS van ROSSUM DAUM
Editor

VIRGINIA HENDRIX
Managing Editor

Sgt BOB KAYS
Technical Editor

DON KELLEHER
Art Director

MSgt BILL FOSTER
Staff Artist

MSgt MIKE KEEFE
Staff Photographer

ALICE MILKEY
Editorial Administration

AFRP 127-1

SUBSCRIPTION—DRIVER is available on subscription for $5.25 per year domestic; $1.35 additional for foreign mailing, 50c per copy, through the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. Changes in subscription mailings should be sent to the above address. Single copies will be sold and back copies will be furnished when available. Use of funds for printing this publication has been approved by Headquarters, United States Air Force, Department of Defense, Washington, D.C. No payment can be made for manuscripts submitted for publication. Contributions are welcomed, as are comments and criticism. Address all correspondence to the Editor, DRIVER Magazine, AFISC/SEDD, Norton AFB CA 92409.

ATTENTION DEPT. OF THE NAVY PERSONNEL: Address all queries concerning distribution to NAVSAFECEN, NAS, NORFOLK, VA 23511, Attn: Safety Education Dept. All other correspondence will be welcomed by the Editor.

The contents of this magazine are informative and should not be construed as regulations, technical orders, or directives unless stated. Address reprint requests, stating intended use of material, to the Editor. The Editor reserves the right to make any editorial changes in manuscripts which he believes will improve the material without altering the intended meaning.

THE EDITOR SPEAKS

DOUBLE CLUTCH

WHAT IT COSTS

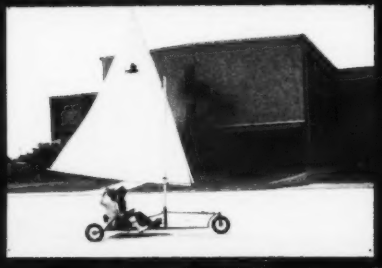
If you are thinking of buying a car, you may be interested in some figures from a booklet called "Cost of Operating an Automobile," put out by the Department of Transportation. The trip from the showroom to the junkyard for a standard-size 1974 model car will cost the owner $15,893 says the government. A compact car will cost its owner $12,875 and a subcompact $11,153.10. The figures are based on a period of 10 years and a distance traveled of 100,000 miles and include insurance costs.

The DOT says that depreciation is the greatest single cost of owning and operating a standard-size car, but that for compacts and subcompacts gasoline is the No. 1 cost.

Over the 10-year period, the cars will wear out their original five tires and require 11 replacements. But if the owner of the standard-size car uses radial tires, he will probably need only five replacements and also will save gasoline.

According to the booklet, 94% of the standard-size and compact cars are being sold with automatic transmissions, 90% have power steering and radios, and 85% of the standards have air conditioners. But only 57% of the subcompacts have automatic transmissions and only 27% have air conditioners.

NEXT MONTH
Landsailing



city driving

So that you may become a slicker city driver, here are a few pointers to keep in mind.

■ Treat a green light as a warning signal rather than as an absolute free pass through an intersection. Traffic lights are placed at locations where experience has shown a situation that is congested or dangerous enough to warrant this sort of traffic control. When a light turns green, and just before you start to move, check both ways for vehicles that have not cleared the intersection or may be running the red light.

■ Obey all posted speed limits and remember that they are designated for the ideal road, weather and visibility conditions. Make allowances for inclement weather, poor visibility, and nighttime driving.

■ Pull to the right (with care) and stop—clear of intersections—when you see or hear emergency vehicles.

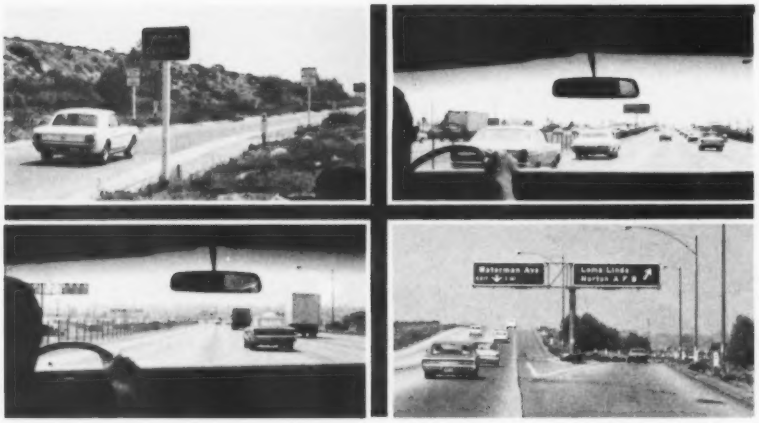
■ Watch your one-way street manners. When you turn onto or from a one-way street, always remember to turn into the correct corresponding lane on the other street. If you are in doubt about one-way street driving techniques, seek information from your local traffic department as to the proper rules and regulations.

■ Not only should you obey the "right of way" rules, but you should be prepared to relinquish your "rights" to those who obviously do not want to drive according to the rules.

Courtesy is probably the key word when it comes to city driving, closely followed by *patience*. If these two qualities could somehow be instilled in every driver, city driving wouldn't be much of a problem.

continued

freeway driving



Mile for mile, freeways* are the safest of all roads. But their special qualities—controlled acces, divided multiple lanes, and higher speeds—call for a special set of driving rules.

Freeways are for "getting there." They are not for the driver who is out for a leisurely, quiet drive. They are designed to handle great numbers of vehicles and, of necessity, service the greater proportion of drivers who use freeways for rapid travel.

Because freeway driving is different from other types of driving, we must tailor our approach accordingly. Possibly the most important advice that can be offered on freeway driving is to keep pace with traffic and keep to the right. This means to drive at the pace the majority of other drivers are driving. At any given moment on any given freeway, the majority of drivers will, with few exceptions, move at the speed that best suits traffic, weather conditions, and posted limits. Too-fast or too-slow driving breaks a smooth traffic flow. Another piece of advice is to treat the left lane on a freeway as a passing lane. It is not a lane where a driver should put himself and try to set the pattern for everyone else behind him regardless of his interpretation of posted speed limits and conditions.

In some states the left lane actually is defined as a passing lane. In others it is the lane for the fastest traffic, and you must move to the right if another motorist wishes to pass, even if you are traveling the legal speed limit.

ENTERING THE FREEWAY

Although freeways have been a part of the American driving scene for some time, there still are drivers who do not know the rules for getting on and off a freeway. These drivers just sort of blunder into it and hope that other drivers are well up on their defensive driving techniques and are paying attention.

**Also called thruways, parkways, expressways, turnpikes, or super highways.*

Entering a freeway is something most younger drivers seem to do better than their elders, possibly because their driver education courses included freeway driving techniques. But there really should be no problem. At the entrance to a freeway you usually travel over a "ramp" that leads directly to the acceleration lane. This lane runs for a short distance adjacent to the through lanes of the freeway. If you have a clear view of the freeway, as you move along the entrance ramp, you should begin to check traffic and try to determine where you expect to blend with the flow. If traffic is light, there is no problem. But if it is heavy you must find a gap, as you move along the acceleration lane, and time your approach to bring you to that gap at as close to the prevailing speed as possible. This means switching on your turn signal, checking your rearview mirrors as you move along, and taking a quick glance or several glances over your shoulder. If you are alert, you will usually be able to blend smoothly with the traffic flow.

If you are following another vehicle as you move along the acceleration lane, you should keep in mind that it may slow down or stop. However, you should make every effort to avoid stopping in the acceleration lane if at all possible. And, you should not expect that drivers already on the through lane will make room for you. Freeway entrance situations are real tests of drivers' true colors. So, with this thought in mind, you might remember that when you are on a through lane and you see another vehicle about to enter that lane, it is only safe and courteous for you to make room for him, either by adjusting your speed or, if the lane beside you is clear, by signalling and moving to the left out of the way of the entering driver.

DRIVING ON THE FREEWAY

Once you are on the freeway, adjust your speed to the posted limit or to the prevailing rate. Stay in the right lane, unless you want to pass. If you are on a two-lane freeway, treat the right lane as the through lane and the left lane as the passing lane. If it is a three-lane freeway, treat the right lane as the slower-speed through lane, the middle lane as the higher-speed through lane, and the left lane as the passing lane.

When driving on urban freeways during rush-hour periods, all lanes tend to fill with traffic. In this case, only you can make the on-the-spot judgment as to whether or not it is practical to treat the left lane only as a passing lane in such situations.

Whenever you change lanes on a freeway, you expose yourself to extra risk. So, before changing lanes check your rearview mirrors, start your turn signal and, just before you leave the lane, take a quick glance over your shoulder to make sure there isn't another vehicle in your "blind" spot.

If you plan to move from an outside lane to a center lane on a freeway that has more than two lanes, you also must check to see that another car isn't about to move into the same gap. Watch for telltale signs in a car two lanes over that might tip you off—turn signals flashing, an increase in speed by the other car, or a car moving toward the edge of the lane. Be prepared to delay your move. Don't try to out-bluff the other driver.

Once you are moving on the freeway make certain you allow a reasonable following distance—at least 300 feet if driving at speeds over 50 mph. Expect to move slightly slower at night.

Unless you are totally familiar with the road or area, you should lay out a travel plan before starting on a freeway trip. Take a map and mark or memorize your route and know your exit by name, number and direction. It's a good idea to also know the exit that precedes it, so you will have ample time to prepare for leaving the freeway.

LEAVING THE FREEWAY

When you want to leave the freeway, move to the proper lane well in advance. Don't dash across lanes at the last minute. If you miss your exit do not, under any circumstances, stop and back up. Drive on to the next exit.

At each exit point, there is a deceleration lane. Its length will vary but, ideally, it should be long enough for you to enter it (after signalling, of course) at freeway speed and to do your braking within its length before you move onto the exit ramp. Unfortunately, like acceleration lanes, not all deceleration lanes are of uniform length—some are too short for the entire braking process. Therefore, you must make another on-the-spot judgment as to when you should start braking. If you must brake on the through lane, and if there is traffic close behind you, allow a little extra time and flash your brake lights as extra warning (in addition to your turn signal) that you are about to slow down and exit.

The exit ramp often is curved, sometimes quite sharply. The exit speed is usually posted—for example, "Ramp Speed 20 mph"—and for good reason. Reduce your speed according to your speedometer, not to your sense of motion. After driving for any distance at higher speeds, you tend to become "velocitized"—that is, you may think you are going slower than you actually are. For example, 50 mph might seem like only 30 mph. Needless to say, this could lead to serious trouble on a ramp designed for 30 mph.

In some cases, the entrance acceleration lane extends into the exit deceleration lane. This means some motorists are moving into that lane preparing to exit at about the same point others are moving out of it onto the freeway proper. Such combination acceleration-deceleration lanes can confuse you if you have never used one before. Be cautious.

Once you are off the freeway, be prepared for such situations as two-way traffic, slower traffic, parked cars, traffic signals, pedestrians and all the other situations you took the freeway to avoid.

continued

braking

When a driver pushes down on the accelerator pedal he expects to go and when he pushes down on the brake pedal he expects to slow down or stop. When it comes to maintaining his car, the average driver usually gives more attention to the "go" than he does to the "stop."

THE BRAKING SYSTEM

Our car's braking system relies on friction for slowing down or stopping —friction between the brake linings and the rotating brake drums, or rotating discs in a disc brake-equipped car. The friction between the linings and the rotating brake drums or discs converts the kinetic energy of the car's motion into heat energy.

Most drivers do not realize the great amount of heat a braking system must absorb and dissipate while doing its job of stopping a car. To give you an idea of how much heat is involved—from the moment your foot touches the brake pedal when your car is cruising at highway speeds until the last inch of roll of the tires when the car comes to a stop, your brakes produce enough heat to melt about three pounds of cast iron.

Where does the heat go? The heat produced is absorbed by the brake drums (or discs) and other parts of the braking system, then dissipated into the surrounding air.

HOW TO OVERTAX YOUR BRAKES

The braking system, then, is designed to absorb great quantities of heat without sacrificing braking effectiveness, while at the same time dissipating as much of the heat as possible into the surrounding atmosphere. The great majority of drivers handle their brakes with the proper care. There are some drivers, however, who like to overtax the braking system with their poor driving habits. Consider the following two examples.

First, we have the driver who constantly drives in spurts—heavy acceleration followed by heavy braking—rather than keeping pace with the traffic. The brakes hardly have a chance to cool down because of his frequent hard stops. This is the type of driver who complains that car brakes just don't seem to last nearly as long as they should.

Then we have the driver who lets his left foot rest very lightly on the brake pedal while he drives. It is just a habit; he may feel he is practicing safe driving by always being ready for a quick stop. Low-to-the-floor power brake pedals—a convenience safety feature for most drivers—make it easy for him to practice his sloppy habit. Meanwhile, his brakes are heating up to high temperatures and, when he suddenly needs braking power, he finds that the brakes have lost much of their effectiveness; they just don't slow the car or stop in the way he knows they should. This situation is called brake fade and occurs because most brake linings tend to change their friction characteristics at temperatures above 400 degrees. And "riding" the brake pedal is a sure-fire way to overheat the brakes.

PREVENTIVE CARE

Until the day arrives when someone invents a braking system that is unaffected by heat, preventive care must be used with good driving habits to keep braking systems effective.

We should use our Owner's Manual for guidance in general brake care and upkeep. And we can look for potential trouble ourselves. It is a good time to check when any of the following things happen: the brake pedal goes down farther than usual, or down to the floor; you have to push harder on the brake pedal to get stopping action; the brakes grab or lock or the car pulls to one side when you brake; you experience brake fade; or, on newer cars, if the red brake warning light comes on, stop and check immediately—you may have a leak in the system (although you will still have

Actual stopping distances vary greatly with the surface of the road (pavement, gravel); the condition of the road (wet, dry, icy); the condition of the tires (good tread, bald); and, of course, the condition of the brakes themselves.

Taking all factors into consideration, only the driver can make the on-the-spot assessment of situations and decide how and when to brake. But better yet, it is only the driver who can avoid situations that require panic braking.

braking action in two wheels because of the dual master cylinder).

Only you can adjust your driving to obtain the most in safety and durability from your brakes. Check your driving habits—honestly—and determine if you are a "charger" or if you are one of those drivers who has a habit of "riding the brakes." If you normally drive too fast for conditions, you will constantly be going to the brakes for help. And, in regard to this, here's an important point to remember—the energy required to stop your car increases as the square of the car's speed. So, when you double your speed, you do not just double the energy required to stop, you increase it by four times as much—four times the amount of heat the brake system must absorb and dissipate. If you keep pace with the traffic, therefore, and allow realistic following distances, you will eliminate a lot of unnecessary braking. And this means better braking effectiveness and longer brake life.

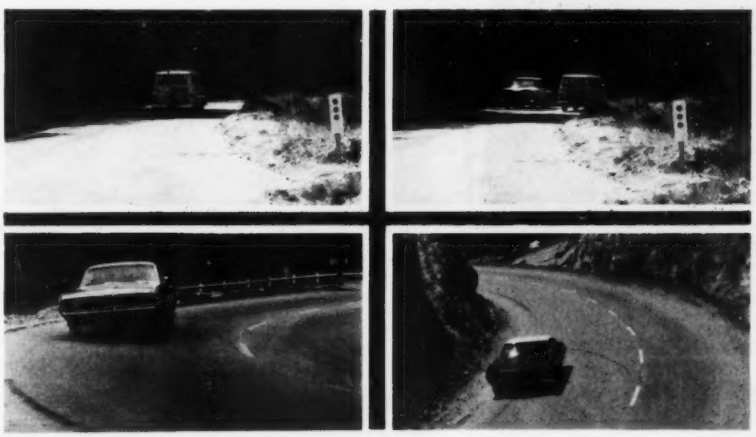
HOW'S YOUR BRAKING ACTION?

A driver's braking action involves perception time and reaction time. Perception time is the time that elapses from when your eyes first spot a situation to the time your brain identifies it as one that requires braking action. Reaction time is the time it takes to recognize the problem and move your foot from the accelerator to the brake pedal.

It is generally agreed that average reaction time alone is about ¾ of a second. But this is average.

It might be less with one driver and two or three seconds with another. Age, physical condition, alertness, coordination, and eyesight all play a part. So do alcohol, drugs, anger, frustration and immaturity. But in ¾ of a second, a car moving at 60 mph travels 66 feet. That's a lot of space in an emergency braking situation. So, you can see why adequate following distances are so important.

curves



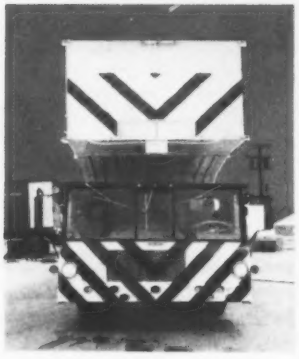
The way a driver takes curves often reflects his overall approach to driving, If he drives through curves at a reasonable speed, heeding the laws of man and Nature, he is probably a reasonably good driver. But the driver who consistently presses legal and natural limits on curves probably presses his luck in other ways, too. And this is the kind of driver who stands a better chance of ending up in trouble.

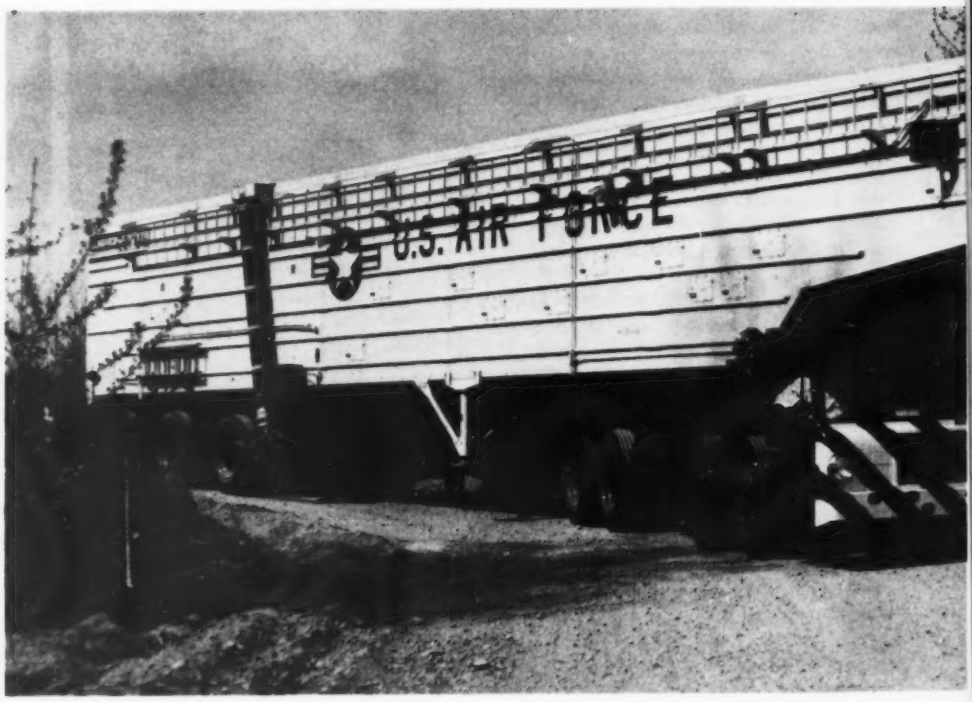
Chances are that many of the "driver lost control" accidents mentioned in the newspapers happen on curves.And chances are that most of the drivers involved were limit pushers, intoxicated, or both. No driver should develop a ho-hum attitude toward curves, just because there seem to be so many of them on our roads and highways. Regardless of how long we have been driving, the laws of Nature can be a great humbler if we become too relaxed about our curve-taking techniques.

CURVES AND PHYSICS

Veteran driver or novice, all of us are subject to the same laws of physics when driving curves. These laws involve such forces as momentum, inertia, gravity, friction, centrifugal force and kinetic energy. To give you an idea of the "laws" you are subject to every time you round a curve, let's take a look at some of the physics involved.

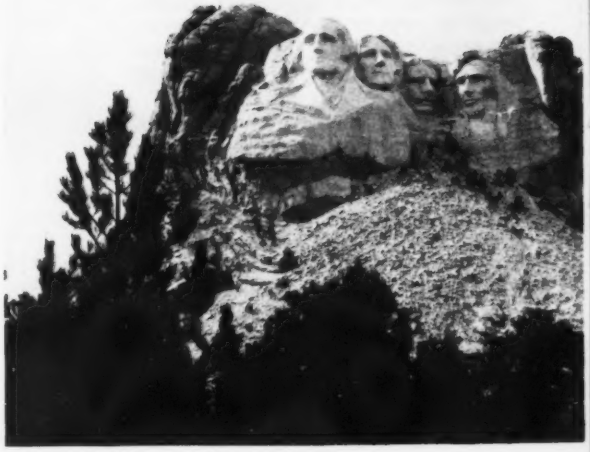
continued on page 19



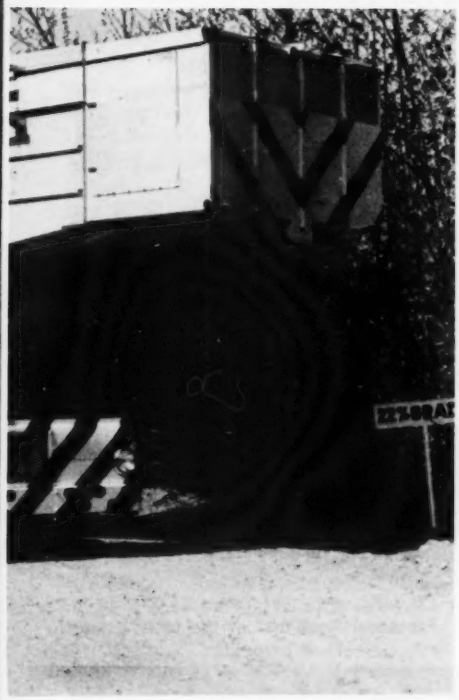


(above)
Transporter erector vans carry Minuteman II missiles to and from the launch sites. Loaded, these vehicles weigh about 60 tons.

(right)
Ellsworth is just minutes from Mount Rushmore, on which are carved the likenesses of Washington, Jefferson, Roosevelt and Lincoln. Sculpturing took 13 years to complete.



In the Black Hills of South Dakota, carved in the sheer granite face of 6,600-foot Mt. Rushmore, are the busts of four great American presidents. Three of these men never saw a person rising above the earth in a flying machine. During the lifetimes of these four presidents, not many people dreamed that one day men in rocket-powered vehicles would land on the moon.



Today at Ellsworth Air Force Base, less than 35 miles from Mt. Rushmore, are two of the three components of American defensive strategy known as "Triad." At this Strategic Air Command nerve center, ICBMs and B-52 bombers are on a 'round-the-clock' alert. The Navy's sea-launched ballistic missiles make up the third component of the strategic "Triad."

Ellsworth AFB logs an impressive amount of mileage each year in support of the SAC mission. In 1973, the base logged over *six million miles* with only *ten* reportable accidents. To anyone who's ever taken time to look at some of the highway statistics, that's not too shabby!

Those miles weren't logged over highways, in staff cars. Some of the driving was on black-top, but most of it was on gravel roads through farmland, in special purpose vehicles. No one likes driving out there, particularly in rain, mud, snow, ice, and bad winds. But in order to maintain the missiles at an around-the-clock operational readiness, the driving mission is vital.

The Wing maintains 150 Minuteman II missiles sites, dispersed over a vast area of western South Dakota. In maintaining the missiles and systems, specialists spend hours driving to the launching sites. The average Air Force base covers about 20 square miles. The area covered by the average missile base will range from 13,000 to 16,000 square miles!

The Wing's vehicles include everything from station wagons to transporter erector vans which carry Minuteman II missiles to and from the launch sites. When loaded, these vans weigh approximately 60 tons. Other vehicles include: pick-ups, campers, 1½ ton trucks, truck-driven cranes, wreckers, tractor-trailers with 40 ft. flatbeds, and five-ton RV (re-entry vehicle) vans which transport nuclear warheads and the missile guidance system. The handling characteristics of each vehicle are different; negotiating narrow, gravel roads, bank curves, slick spots—each vehicle handles differently.

HAZARDS

Driving on unpaved, washboard roads over long distances doesn't make for happy motoring. But that in itself isn't the worst part of it—not by any means. Of course, these roads don't have marked lanes like those in and around towns and cities. Not only that, they're narrow and off to either side you have deep ditches. When a farmer is coming toward you, in a big combine or a hay wagon, you've got an instant problem.

Daylight driving presents certain challenges, but night driving is the real bad scene.

"When you go over those roller-coaster hills at night, the lights on your vehicle shine straight up. The road

continued

Driving Missiles

Keeping a missile base in business calls for a lot of drivers with skill, stamina and plain old grit

by JOSEPH STONICK

(near right)
You are plugging along and suddenly you see a cow or an antelope or a big deer. You've got to anticipate these things and be ready to act.

(far right)
When the convoy goes out, it's accompanied by a helicopter.

looks straight. So you hit the top of a hill and you just might find an "S" curve. Maybe another vehicle is coming. Even at 25 mph, it's bad at night—you just can't see over the hills. On a lot of the "S" curves, even at 25 mph, you just can't make it around them. One mistake and you can flip a truck before you know what happened."

The real clincher for drivers has to be the weather. "The fog," mentioned an airman from the West Coast who's seen plenty of fog, "is a bad news thing. We get a lot of it in the area of the missile complex. And it just won't burn off. It just stays thick and as dense as any I've ever seen."

In summer, winter is a great topic of conversation. Comes winter, comes snow, comes ice, comes wind, comes cold and colder.

Extreme cold weather is the topper so far as driving conditions go. There's nothing between the base and the North Pole to break the cold winds and blowing snow.

A few of the comments we heard on winter driving went like this:—"Snow, of course, is one of the big problems out in the farmlands. When snow starts to drift in the gravel road areas, you really don't know where the road is. Sharp turns at the bottom of hills aren't uncommon. You have to watch that the vehicle doesn't slide on you. Under these conditions, power steering is a hazard. Most of the weight is on the back wheels. It brings the front up and screws up the steering."

—"Black ice is bad news—particularly on bridges. You come over a hill and you can't see the ice. Then you hit it and start sideways. I mean, *bad* news!"

—"A bad problem area is on interstate bridges where sometimes you're holding into the wind. Then you get

The camper crews are prepared to stay out for three days at a time so a pre-trip inspection of the vehicle is good insurance. Electrical hook-ups at the launch site provide them with heat and cooking facilities.

If the mobile maintenance team can't repair a vehicle in the field, they drop the drive shaft and get a wrecker out to bring the vehicle back.

off the bridge and the wind will be baffled or diverted around the bridge. So you find yourself still correcting for it and all of a sudden you've got nothing pushing against you. So you straighten the wheel and about that time, here it comes again. The first two or three times it happens to you, it's exciting—to say the least!"

—"In this area of the country, we have a lot of freeze-thaw cycles. What happens is that the top of the road is completely dry or has just occasional ice patches. It leads a driver into thinking that road conditions are pretty good. Then, all of a sudden, he goes over the north slope of a hill and WHAM! You just can't stop quick."

FATIGUE

Just about everyone who drives out in the missile complex has something to say about fatigue and driving. One supervisor told us, "Let's say a man reports for work at eight a.m. He may not get dispatched 'til two o'clock in the afternoon. By the time he gets his vehicle and equipment checked out, it might be four o'clock before he leaves the base. It might take two or three hours to get out to where he has to do his work. Let's say that he and his partner have several hours of work to do out there. After they finish the work, they have to turn around and get back to the base. By now, these guys have probably been up about 20 hours. So on the way back to the base, they're really tired. As often as not, they're driving back in the dark. On top of that, maybe they've been fighting snow, bad winds, or muddy roads. Well, with fatigue on top of that, you can get the picture."

One way the wing has kept fatigue accidents to a minimum is by having the men drive the "buddy" system. Two men have to stay up front and both have to stay awake while on a mission. Driving back to the base after a long, tiring day in the field, it's easy for a man to start thinking about getting some sleep. His mind starts to drift. That's just about the time the buddy has to take over.

If a vehicle breaks down or gets stuck out in the "boonies," it usually doesn't take long to have help on the way. Every vehicle out in the field is monitored by the Transportation Control Center (TCC). They know where vehicles are at any given moment and of any problems.

When a convoy goes out with a missile or warhead, they call in to TCC every five minutes en route for a security check and to report their position—not the physical location, but the grid coordinate location. When this type of convoy goes out, it's always covered by a chopper flying overhead. TCC also monitors the chopper.

ON SITE

Travel times are figured to each site. If any vehicles are late, TCC checks to find out if they're broken down or had an accident. One of the most critical times is during foul weather. If radio-equipped vehicles can't be contacted by TCC, other radio-equipped vehicles in the field are asked to try making contact. At this time, TCC goes to a checklist type operation. The Launch Control Facility is alerted by phone. Civilian spotters, comprised of volunteers throughout the area, are asked to be on the lookout. If the vehicle or vehicles are still not spotted, TCC calls farmers in the area who would be aware of vehicles going by. Choppers are alerted.

In extremely cold weather, a very close check is kept on people in the field. There's always the possibility that they could be stranded and freeze. Personnel going into the field are given detailed briefings on how to survive in an emergency. Vehicles carry survival kits, one for every three people, and also a roadside kit.

The launch sites are protected by highly sophisticated electronic surveillance gear. The equipment is so sensitive that weather conditions, or even birds flying through, can trigger alarms. Usually the site will reset itself. But in winter, when there's a snow build-up, water can accumulate and trigger an alarm. Then a Security Police team will have to go out and shovel off the snow. They'll respond at any time of the day or night. When they get to the site, they might have to dig a trench so the water will flow off the site. If the site will reset, they can come back to the base. If not, a maintenance team must go out. If there's none in the area, a Security Police camper crew, equipped with rifles, food, and emergency equipment, keeps it secured until either a maintenance team or a relief Security Police team gets there.

The Security Police teams work on a schedule of three days on and three off, while on camper duty. They're prepared to be out there for three full days. Electrical hook-ups at the launch facilities allow them to have warm food and heat in the camper.

Only top-notch drivers are selected for camper duty. Their safety record reflects their proficiency. As of our visit, they hadn't had a reportable accident in two years, only a couple of minor scrapes. A supervisor of the camper-drivers said, "Put these drivers on a regular road and they're far superior to any driver."

The camper-drivers we talked to seemed to share an opinion about vacation campers. Their advice: "If you're

continued

When Weather conditions are bad—in winter a chill factor of 30 or 40 below is not uncommon—the driving mission becomes a challenge to the best of drivers.

continued
DRIVING MISSILES

going to drive a camper on rough roads, stay away from the automatic shifts; go with a standard shift. Get a four-wheel drive and stay away from power brakes, power steering, and automatic transmissions. Also, never buy a crew-cab for a camper because it makes it *more* top-heavy. Wind is a big problem for campers because they're so top-heavy you've got to watch the speed and slow down when the wind is up.

MAINTAINING VEHICLES

With all the mileage the Wing puts on these vehicles while driving over rough roads, it's not only tough on the men and the vehicles, but it's also tough on the vehicle maintenance shop. Trying to keep these vehicles in good running condition is some kind of challenge. A lot of them have seen 100,000 miles, and some are pushing 200,000 miles. With this much mileage they have had more than one engine, but the rest has been nursed along by highly skilled mechanics. Clutches, engines, and transmission get a lot of attention. Maintenance at the support base is a never-ending thing.

While the base maintenance shop keeps them ready to hit the road, the *mobile* maintenance teams do everything they can to keep them in the field and eliminate the need to bring them into the base for repairs. Mobile maintenance teams trouble-shoot in the field and make repairs out there, if at all possible.

Should something go wrong with a vehicle in a convoy transporting a missile or a nuclear warhead, mobile maintenance would respond immediately, to get the convoy going. Meantime, that chopper hovering over the convoy is burning a lot of fuel waiting for the convoy to proceed. Getting a stalled convoy moving quickly is a critical part of the mobile maintenance teams' mission.

Most of the mobile maintenance personnel are young airmen. All are volunteers, all are graduate mechanics, and all are *good* mechanics. When they're in the field, there's no supervisor with them; they're on their own. Normally, they pull a 12-hour duty day, but when they're in the field they might work around the clock. They actually live in the field for three days and don't come in until there's a crew change. When they're informed that a vehicle has a problem, they'll drive to its location and determine if it can be fixed out there. If not, they drop the drive shaft and get a wrecker out to bring the vehicle back to the support base.

Wrecker personnel, understandably, have a lot of stories to tell about the situations they've been involved in. One sergeant recalls this incident.

"Because of a bad, muddy road situation, a big truck was stuck, and it had to be recovered. They sent out a truck-driven crane, and he got out on a muddy, dirt road and immediately sunk up to his axle, due to the weight. Several other vehicles got involved. They sent the wrecker out and he hooked on to a vehicle to pull it out. The mud was so slick, like slime, that he slid right into the truck he was trying to pull out. We had about five vehicles stuck out there, all at one time. They were vehicles that were on a high priority and they had to be moved. We ended up with two of our wreckers and another crane out there, all trying to get everybody out. We run into situations like that. Whenever it rains, we really get into some slick operations out there. They're not so funny when they're happening, but they're good for conversation at the club, after you get back."

TRAINING

Drivers' training plays an understandably important role in how well and how safely drivers perform in the field. One instructor told us—"We don't put anyone into a driving job who doesn't have a civilian driver's license. We don't train them from scratch. We screen records to determine driving records. High-risk drivers aren't allowed to drive these vehicles."

After driver's training, usually a two-day course at the base driving school, they get a standard government vehicle operator's license which qualifies them to drive up to one-and-a-half ton vehicles, pickups, station wagons, etc. Vehicles over 1½-tons are considered special purpose vehicles and they require specialized training to drive them. The individual squadrons have their own drivers' training for qualifying people to drive their special purpose vehicles.

The student is with a qualified driver-instructor at all times until he's checked out. Depending on the type of vehicle, that covers about 10 to 12 hours of behind-the-wheel operation.

A special purpose vehicle instructor commented, "Even though a man may know how to drive a four-speed, he has to learn how to split-shift and double clutch, and he has to learn the different handling characteristics of the bigger rigs. The cornering is different, and the braking is different. The whole handling aspect of the unit is different."

The missile handling teams not only transport explosives, but they drive the big vans that haul the missiles. These vans are about 120,000 lbs. of truck, when loaded. They're massive and it takes some pretty special talent to drive them. The training of a team chief for a missile handling team takes in the neighborhood of six months.

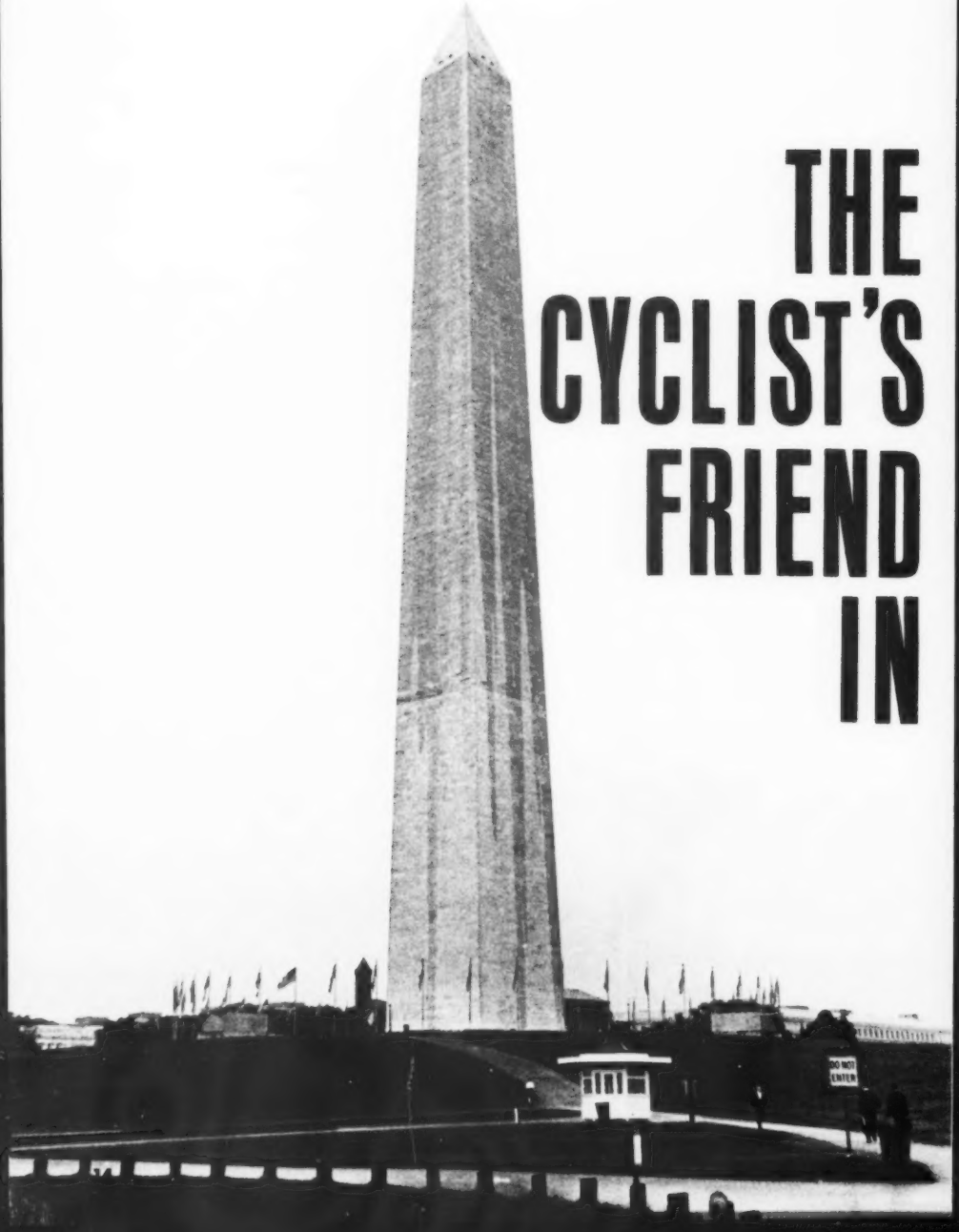
The critical importance of safe driving is brought to focus by the Wing Commander of the 44th when he personally talks with newly-arrived personnel: "I know we'd have no motor vehicle accidents at all if we didn't move a vehicle. But keep in mind that driving's our business. We can't keep these missiles on alert and move our people around out there without vehicles. In order to get the job done, there's a certain amount of risk involved. From there on, I can't split mission accomplishment and safety. You guys are important to us. That's the way we look at this thing. Safety is no better than what's happened in the last half-hour. You can never turn your back on it. So, don't tune us out when we talk about safety. We're going to help you to stay alive and healthy. We need you."

"In many parts of the country, this time of year brings that warm spell known as Indian Summer and a last chance to enjoy water sports. Just because it's the final time out for the year, don't be tempted to let safety precautions slide. Having everything in proper shape is as vital now as it was last spring. And that means not just the boat but also life preservers, SCUBA gear, water skiis and tow lines—and, of course, your own physical conditioning."

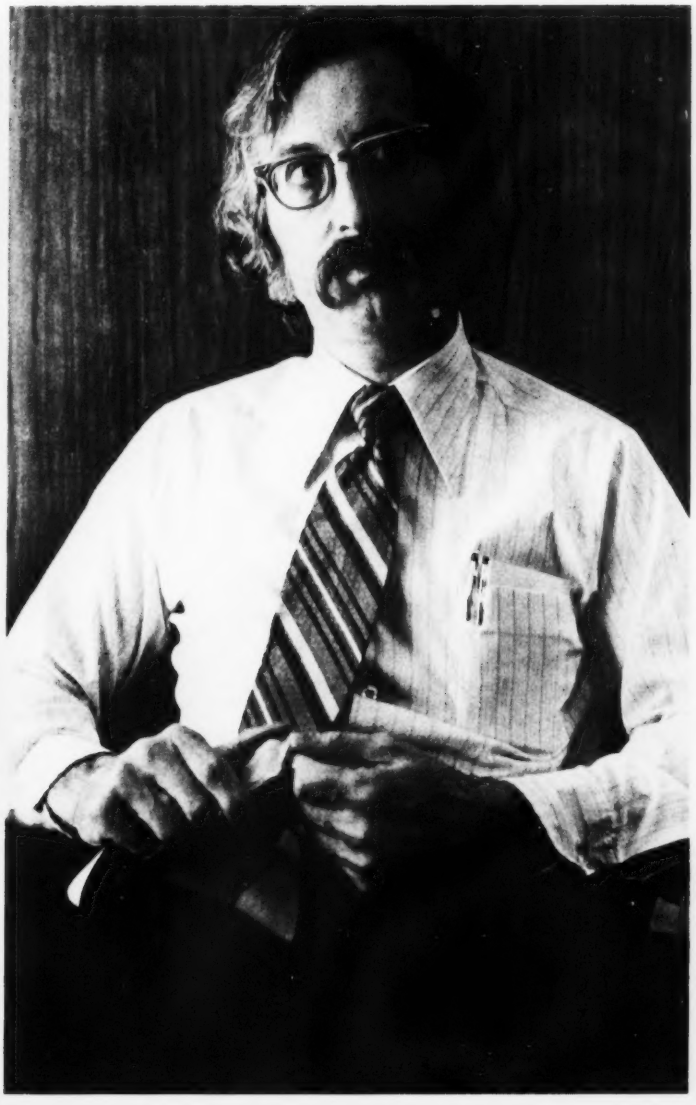
CATHY MADLIN
DAVE MAZA

Yes, gang, there really is a motorcyclist at the National Highway Traffic Safety Administration

THE CYCLIST'S FRIEND IN D.C.



LEWIS S. BUCHANAN



"Motorcycle enthusiasts are well represented on the NHTSA staff. It is the policy here that our mutual efforts be focused on reducing some of the unnecessary risks in motorcycling without placing unwarranted restrictions upon the motorcycling sport or industry."

If you're one of those motorcyclists who thinks federal safety standards are being thought up in Washington by some bureaucrat who wouldn't know a motorcycle if he fell over one, we'd like you to meet Lewis S. Buchanan.

Lew is the motorcycle safety specialist for the National Highway Traffic Safety Administration. He's been riding motorcycles regularly since 1965, usually rides to and from work, and averages 10,000 miles a year. He has raced more than 1,000 miles in competition and doesn't hesitate to admit that he's had some crashes while racing. He's taken falls on the street, too, but he's never had a collision with a car. When we visited Lew in Washington we asked him about his personal riding techniques.

Buchanan: I always ride in the day with my headlight on. And I'm careful to avoid other people's blind spots. I observe motorists and keep away from the erratic drivers. I don't filter either (ride between lanes of moving traffic). Although that's against the law almost everywhere, you see a lot of it.

DRIVER: *Are you concerned with the image of the motorcyclist?*

Buchanan: I am concerned, though I really don't think it's the problem it used to be. Nowadays just about every neighborhood has a motorcycle or two. People are getting used to seeing them on the street and are recognizing the fact that all riders aren't outlaws. I personally try to avoid situations where I might create resentment among drivers of other vehicles.

continued

DRIVER: *Motorcycles are really getting popular with service people. For instance, as many as 350 new cycles come back on a Navy ship after a Pacific tour. Some of these new owners have never ridden before. They uncrate and take off without any training or practice. Do you have any comments for such riders?*

Buchanan: When people ask me how they should learn to ride, I tell them to start on the dirt, off the road. Motorcycles are easy to ride. The problem is that they are *so* easy to ride that people fail to learn the skills they will need to react instinctively in an emergency situation in traffic. New riders must concentrate on and practice defensive riding and guard against over-confidence.

I don't think, for example, that anybody ought to commute to work on a cycle until he has at least 500 miles' experience off the road or on secondary roads. And I don't think a person should carry a passenger until he has had six months' experience. A passenger very significantly affects the handling of the motorcycle. In fact, if you are a small operator on a small cycle and you have a large passenger on the back, the passenger can steer the motorcycle more than the operator. New riders don't give a thought to that and the passenger certainly doesn't think about it.

DRIVER: *What about riding in traffic?*

Buchanan: We all know that about two-thirds of all motorcycle accidents are caused by the motorist and not the cyclist. But we can't excuse ourselves as cyclists by saying these accidents are unavoidable. A big percentage of them could be avoided if the cyclist had practiced good defensive techniques in advance. Riders must assume that other drivers are going to make mistakes and that motorists often aren't going to see the motorcyclist. If you get into an accident situation, you have to have skills that you have drilled into yourself and that you can call on instinctively, especially in terms of braking.

DRIVER: *In other words, have a way out?*

Buchanan: Right. You know, we have too many false generalizations in motorcycling, such as the notion that if you use the front brake excessively. you'll get thrown over the handlebars. So we frighten beginners into not developing the proper braking technique. Because of the weight shift, you get up to 70% of your stopping ability from the front brake. Many

"Only eight years ago motorcycle registration in this country passed 1.5 million. This year's sales alone could exceed that. We would not be surprised if ultimately motorcycles comprise 10% of all registered vehicles in this country."

novice riders are so afraid of the front brake that when they get in an emergency they just hit the rear brake. Then they lock up and just keep sliding. So they need up to twice the stopping distance they would use if both brakes were applied together.

DRIVER: *We can't talk motorcycles without talking helmets. How about riders who say, "It's my neck and nobody else's"?*

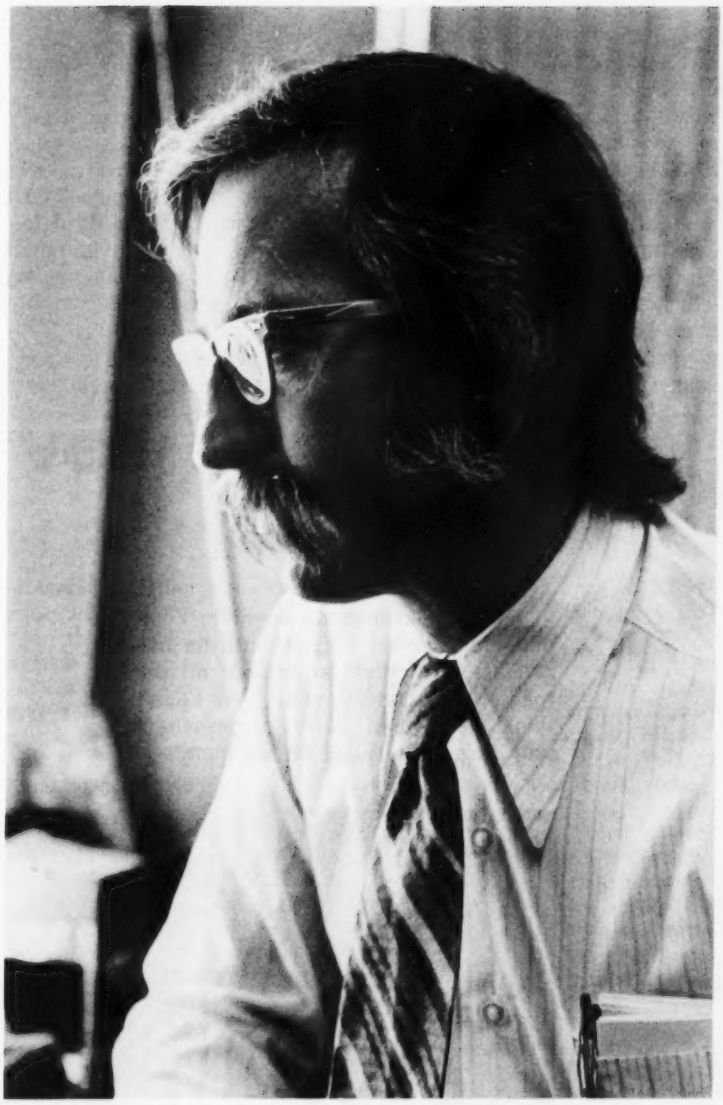
Buchanan: Essentially, that's true. But we think it's a legitimate concern of the state to require reasonable protection in a high-hazard activity. People often tell me, "I always wear a helmet but I don't think the state should require me to do so." But our studies show that where there are no helmet laws, fewer than 30% of the riders wear helmets on a volunteer basis.

Let me give you just one statistic: In the state of Illinois, which does not have mandatory helmet usage, motorcycle accidents resulted in three times more fatal and serious head injuries, twice as much head injury of lesser severity and, overall, 2½ times more general head injuries than did similar accidents in the state of Michigan, which does have a helmet law. Helmet laws do a good job. There's just no doubt about it.

DRIVER: *How do you answer people who argue that helmets impair hearing and reduce the field of vision?*

Buchanan: Helmets that cover the ears do limit hearing slightly, but far from the point of being a hazard. Several full-coverage helmets have vents over the ears to improve hearing and ventilation. Anyone who has ridden a motorcycle knows that he is exposed to engine noise and often it is difficult to hear over the engine whether you're wearing a helmet or

continued



"Those who oppose mandatory helmet laws are vocal, but surveys show that most motorcyclists really approve of such laws. A public opinion poll in Wisconsin showed that 62% of the motorcyclists favored compulsory use of helmets."

not. A motorcyclist wearing a helmet can probably hear as well as, if not better than, a driver in a car with the windows closed, the air conditioner on, and the radio playing.

With regard to impairment of vision, particularly peripheral vision, the idea that helmets create a hazard isn't supported by accident studies. The Z90.1-1966 standard promulgated by the American National Standards Institute and adopted by a number of states recommends that a helmet provide a range of peripheral vision of approximately 120 degrees. The new federal standard calls for at least 105. You know, a skilled motorcyclist will continually turn his head from side to side to get the fullest view of the surrounding traffic. This technique, coupled with the field of vision recommended in the standards, assures that the cyclist's peripheral vision is not significantly impaired by the use of an approved helmet.

DRIVER: *Motorcyclists feel that in most states, tests for licensing are more or less a farce—a couple of turns around some cones and a circle or two. What do you think?*

Buchanan: The motorcycle driver licensing tests in most states are very superficial. They're enough to tell if a rider knows where the controls are and if he can start and stop the machine. But the test's relationship to a rider's ability to recognize and avoid accident situations is very limited. Anybody who can ride a bicycle can take a lightweight motorcycle and practice for half an hour and pass the test, in just about any state. We are going to have to develop more sophisticated tests involving substantially higher speeds. NHTSA has a research program under way to develop better tests. We hope to set up a facility in cooperation with a university and a state licensing agency where we could train teachers and also run a school. In an environment like that, we can learn a lot about testing.

"I don't think anybody ought to commute to work on a cycle until he has at least 500 miles' experience off the road or on secondary roads. And I don't think he should carry a passenger until he's been riding for six months."

continued from page 7

REVIEWING THE BASICS

curves

First, friction. It is the friction of the tires against the road surface that makes it possible for the car to change direction when the front wheels are turned. If this were not the case, the law of inertita would make the body in motion (the car) tend to stay in motion in the same direction. Also, it is friction that lets you actually make the wheels turn. If it weren't for friction, your hands would just slip along the steering wheel and you wouldn't be able to steer the car. Friction of the tires against the road surface lets you put the car in motion, accelerate it, maneuver it, and slow or stop it.

How much friction effectiveness you can count on when driving a curve depends on several things—the amount of tread on the tires, condition of the road surface, composition of the road surface, the angle at which the curve is banked, and speed. Speed is where you enter the picture. While you are actually negotiating a curve, this is the one factor you have control over at that time.

When you enter a curve, your car still wants to go in a straight line. The force that tends to push you away from the center of the turning radius is centrifugal force. When you steer around a curve, friction and gravity team up to try to overcome the centrifugal force—and they can, if you cooperate. But if you give centrifugal force a strong ally—too much speed, the one factor you can control—centrifugal force can overcome the friction-gravity traction team, and you may find yourself skidding off the road or into oncoming traffic depending on which way the curve runs.

To give you an example of how speed relates to centrifugal force, consider a 3,000-pound car going into a curve with a 500-foot radius at a speed of 30 mph. The car has to overcome a centrifugal force of about 350 pounds. If the car goes into the curve at a speed of 60 mph, the centrifugal force increases to more than 1,400 pounds. The speed was doubled, but the force trying to push the car off the road increased four times.

Centrifugal force can count on some other allies in addition to speed—smooth tires, wet or icy road surfaces, and gravel-surfaced or bumpy roads. Only the driver can make on-the-spot allowances for these conditions. The ultimate judgment of the person behind the wheel determines if the car will enter a curve safely or at a speed likely to cause it to go out of control.

CURVES AND MAN-MADE LAWS

To help keep drivers in place on the road, and on their own side of the road, man-made laws are set up to see that Nature's laws don't gang up on an unsuspecting motorist. This is why there are posted speed signs a short distance before some curves begin. When you see such a sign, adjust your speed accordingly (by the speedometer). And keep in mind that posted speeds are based on good weather and visibility conditions.

If you find you must reduce your speed by braking as you approach a curve, do so before you enter the curve and while your front wheels are still in a straight-ahead position. Applying the brakes after you are in a curve adds just that much more push to those forces that may already be in critical balance. It may be just enough to overcome the friction that is keeping the car on its course. Try to adjust your speed so you can "drive" through the curve—that is, instead of merely coasting through the curve, apply enough power to maintain a reasonable, steady speed compatible with the particular curve. Do not start to accelerate until you are past the apex or center point of the curve, and then accelerate gently into the straight.

A point to remember. When you drive into a curve at night, your headlights light up as much, or more, roadside as they do actual roadway, depending on the angle of the curve. This is another reason why you should reduce your speed.

Passing on curves is strictly taboo on two-lane highways. Freeways usually are laid out with gentle enough curves to allow passing at posted speeds (if conditions are good). But pass with caution even on freeways; you never know when the driver in the adjacent lane may drift into your lane.

One final point. It is important to stay centered or slightly toward the outside of your lane when you negotiate a curve on a two-lane road. The driver coming in the opposite direction may be occupying a piece of the center line. If you're doing the same thing, you're likely to be introduced to each other—the hard way.

(Information in this article courtesy of General Motors)

Larry Johnson began his riding career back in 1948 with a Cushman motor scooter. He soon moved on to a Mustang Motorcycle, a '48 Harley, then a '62 Harley. Currently he owns a '58 Cushman Eagle and a Honda CB 350. Larry is a Navy officer stationed at Norfolk. In addition to motorcycling, he enjoys flying with the Norfolk Navy Flying Club. He presently holds a commercial certificate with instrument and multi-engine ratings. DRIVER considers him well-qualified to give advice to new riders; the views expressed in these columns are strictly Larry's own.

The first time I straddled a two-wheel motorized vehicle, I was fourteen. Now I realize that I can't dignify that Cushman as a motorcycle, but it did have two wheels and a motor, it was licensed to be on the road, and I was out there in competition with automobiles. At fourteen, I guess the boundless confidence of youth was upon me and I just knew I would live forever.

The shop where I bought the scooter had a club, the ROAD MICE, and man I joined up—I mean that was IN. (My mother had another name for them.) The group was a mixture of machines, including a couple of home builts.

One guy I will never forget, though, was not a club member. He was a sergeant of the California Highway Patrol, and he used to pull into the shop so often that he was as good as a charter MOUSE. I think that guy lived on his Harley Police Special. To this day I can hear his voice: "If you guys don't remember anything else, remember this: If you know why accidents happen, then you can keep them from happening."

We'd go on group rides, and when we stopped for a break he'd be there, putting out advice, chewing on some guy who had been clowning, pointing out good plays we'd made. I think he was our guardian angel in disguise. He busted a couple of us once when he caught us really out of line, and then went to bat for us with the judge.

We were all sorry when he got a desk job because he would not be with us any more, and because he got the desk job the hard way. He forgot his own first rule. He was using his red light and siren to get to the scene of an accident and went into an intersection without checking. An ambulance, also using red light and siren and going to the same accident, creamed him.

If you know why accidents happen, then, you can prevent (also avoid) them. Well why do they happen? Let's look at some of the factors:

INEXPERIENCE —This may be just plain new bike syndrome. The rider hasn't mastered the controls yet. This kind of thing can be beaten just by getting practice in a parking lot or a low traffic area before taking on the heavy traffic. The first couple of times out, an escort rider might be a good idea. As a man (or woman) gets more time and miles under their boots, they learn to "read" the traffic like a line backer learns to read an offensive line-up. Then comes another problem.

OVER-CONFIDENCE —The "I can hack anything" attitude suckers the rider into traps. Remember this—you rate a chunk of road the same as any licensed vehicle—but stay in your chunk and don't invade someone else's.

CANNON BALLING —Coming out of a stop at 9 grand in low takes almost all of the weight off your front end —a rock, chuck hole, irregularity, anything can throw your front end up in the air—then what do you do?

TUNNELING—SHOULDERING —Anyway you look at these they are bad. You may tunnel between two lanes of cars just about the time the guy up front swings his door open to get out and see what is wrong up ahead. Or maybe you run up a right side shoulder and some guy in a car swings out on the shoulder in front of you—then what? Tunnelling may be a short cut through a traffic jam but it isn't worth the price that is frequently paid!

VISIBILITY —You on a "motor" do not make a big target especially when a guy is looking in his rear-view mirror for another car. A cigarette held in front of a driver's face will hide you at 50 feet. In heavy traffic, a driver trying to get into the flow may pick your hole to dart into because he doesn't see you there.

BAD WEATHER —Rain, fog, snow and ice—these will get the fair weather rovers off the road. If you are going to be an all-weather rider, double your distances, keep an extra margin of reaction space around you and above all remember VISIBILITY. When the weather is really sour maybe you had better cancel out.

INTERSECTIONS —Always bad because, again, you can't be seen that easily. Approach an intersection with the full understanding and expectation that someone will dart out without warning.

These factors that I've discussed are by no means a complete list. There are many more as well as variations. Keep in mind that accidents happen not because of just one factor but because several can gang up. Riding in a way that minimizes the effects of these factors is called Defensive Driving and is the only way to go.

Statistics show that motorcycle accidents happen most in urban areas during daylight and clear weather. This is food for thought.

Understand the factors we have talked about here. Statistics describe what **Has** happened, but they do not dictate what **Must** happen. When you go out to ride, remember some of the ideas I've mentioned, avoid accidents, and enjoy motorcycles more.

Many Happy Miles

Larry Johnson

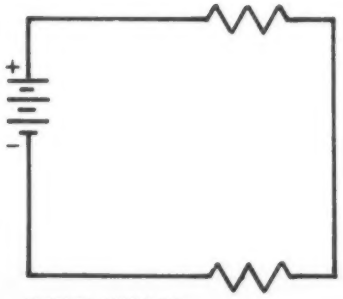
BEHIND THE HANDLEBARS

by
Larry Johnson

ACCIDENTS

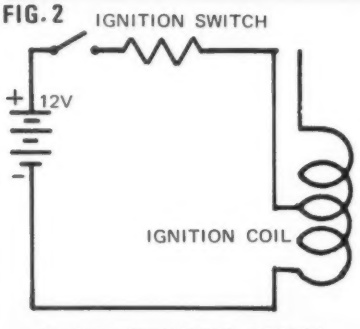
BASIC ELECTRICITY FOR AUTO MECHANICS

FIG. 1



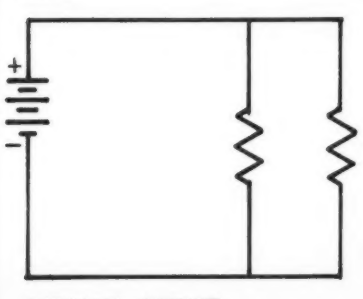
SERIES CIRCUIT

FIG. 2



IGNITION (PRIMARY) CIRCUIT

FIG. 3



PARALLEL CIRCUIT

Electrical problems—even simple ones—are undoubtedly the car ailments that are most baffling to the average backyard mechanic. This is primarily because most people don't understand much about their car's electrical system —and most don't care to get much beyond the battery.

Fortunately most automotive electrical problems are limited to burned-out bulbs or fuses, broken or shorted wires, or uncharged or corroded batteries. But knowing a bit about your car's electrical system can save you a lot of hassle and money in the event of a malfunction. And even simple electrical problems sometimes require a bit of semi-sophisticated knowledge to solve.

So in this "Backyard Mechanic" we'll discuss basic electricity theory, simple DC circuits, schematics, abbreviations, and symbols. If you brush up on these basics you should be able to handle minor electrical troubleshooting problems. And you'll be prepared for the basic electrical repairs we'll discuss in future "Backyard Mechanics."

WHAT IS ELECTRICITY?

Electrical current (I) is measured in *amperage* (the number of electrons passing a given point in one second—about 6,280 quadrillion per amp). The electrons are moved by an electromotive force (E) called *voltage* against resistance (R), called *ohmage*, in the conductor wire. In your car, the electromotive force is supplied by the battery and generator (or alternator).

However, to keep this lesson in the "basic" category, just think of the current charge" as being the result of resistance to moving more electrons from Point A than exist at Point B. The electrical *potential* difference is measured in volts, and the electron movement in amps.

Ohm's law can be applied to most electrical problems, in solving for resistance, voltage, and current:

Current which flows in a circuit is directional to the applied voltage, and inversely proportional to the resistance.

This can be broken down into the equation:

$$I = \frac{E}{R}, \quad R = \frac{E}{I}, \text{ and } E = I \times R$$

For example you have a circuit which draws 2 amps at 5 ohms; the voltage across that circuit is 10v (2x5). Try a few problems of your own to get familiar with the all-important Ohm's law—you'll be using it often if you do your own troubleshooting.

POLARITY AND FLOW

Originally, scientists thought that current flowed from a positive point to a negative point. It is now known that *electrons* actually move from negative to positive, although the idea that electricity flows positive-to-negative is still retained for electrical circuits. But the most important thing for you to remember as a mechanic is that proper polarity must be observed when connecting certain components and instruments. Damage or misreadings can occur if the polarity is "reversed."

SERIES AND PARALLEL

One look at the schematic, or wiring diagram of an automobile might give the impression that you've gotten into something 'way over your head.[a] Actually, when considering one circuit at a time, the entire system is easily understood. The headlight circuit is a simple parallel circuit. But, before you read on, study the schematic symbols on pages 22 and 23 so you will understand what the schematic represents.

Fig. 1 is a simple series circuit; so is Fig. 2. A parallel circuit is shown in Figs. 3 and 4. And the series-parallel

continued

FIG. 4

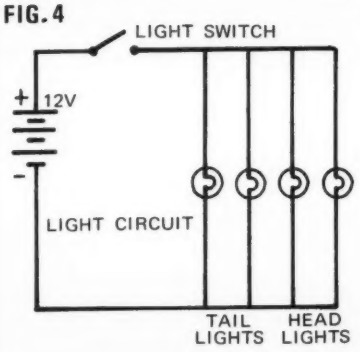


FIG. 5

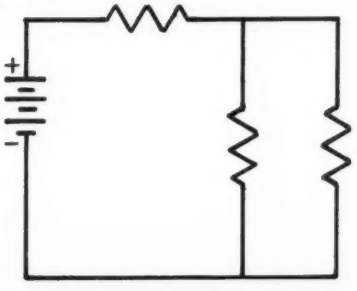
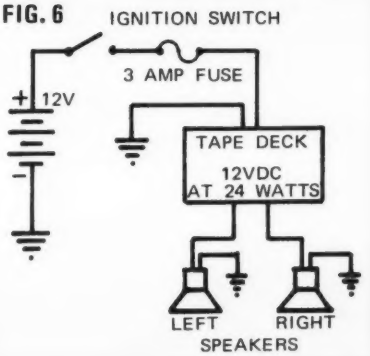


FIG. 6



circuit is shown in Fig. 5, but this one won't be of much concern to you at present.

WATT'S LAW

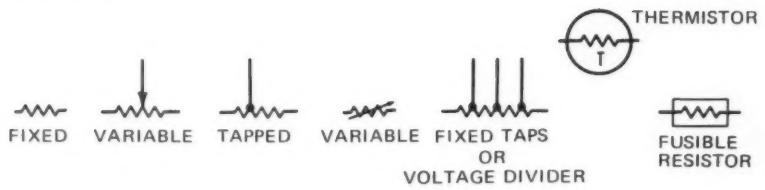
Another important equation, w = I x E, is often used in troubleshooting. "w" stands for *watt*, which is a measurement of power. And, as with the Ohm's law equation, you can manipulate this one to find any unknown factor. For example, let's say you want to protect the tape player in your car by inserting a fuse in the "hot" lead. Your car has a 12-volt battery, and a tag on the back of the player says the unit draws 24 watts.

Knowing that $I = \frac{W}{E}$, you figure the current to be 2 amps. Therefore, a 2½- to 3-amp fuse will safely do the job.

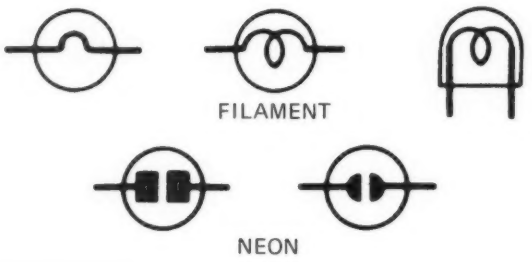
AC AND DC

Charging systems equipped with alternators have an AC circuit. All other automotive electrics (excluding radios, TVs, tape recorder/players, etc) are DC circuits. We'll discuss alternating current later, when we have a look at alternators. Meanwhile, study these laws, symbols, abbreviations, and schematics and you should have a good idea where to start when troubleshooting electrical problems.

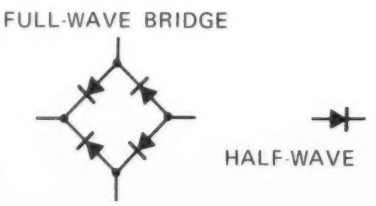
RESISTORS



LAMPS



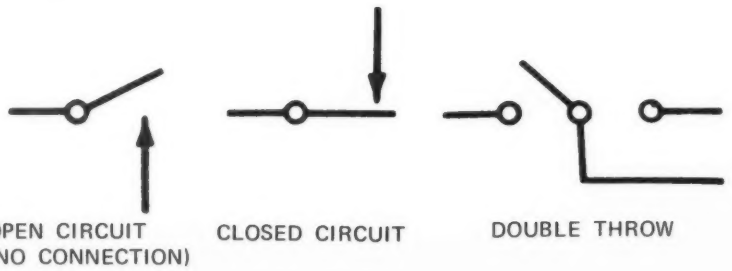
RECTIFIERS



TRANSFORMERS (IGNITION COIL)

METERS

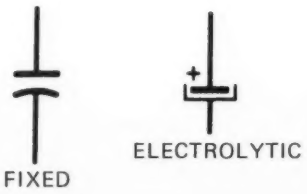
SWITCHES



ELECTRICAL ABBREVIATIONS

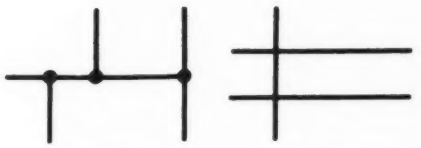
Units	Symbols	Description
Ampere	A or amp	Unit of current
Current	I	Electricity (normally measured in amperes)
Horsepower	hp	746 watts
Kilovolt	kv	1000 volts. (The prefix "kilo" means one thousand.)
Milliampere	ma	0.001 ampere
Ohm	Ω	Unit of resistance
Volt	v	Unit of pressure difference
Voltage	E	Electromotive force
Watt	w	Unit of power. One watt is equal to one ampere of current under the pressure of one volt.
Watthour	wh	Unit of work. (Power x Time)

CAPACITORS (CONDENSER)

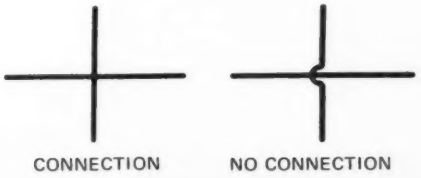


BATTERY

WIRING

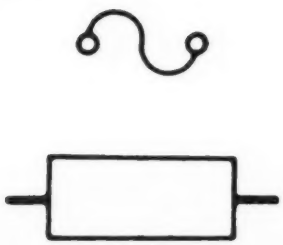


METHOD NO. 1

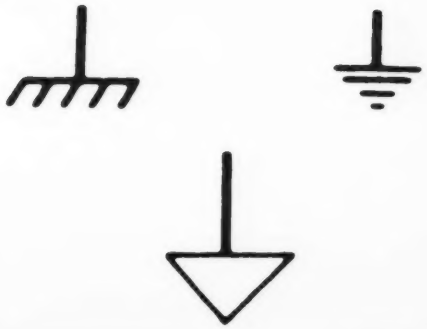


METHOD NO. 2

FUSES



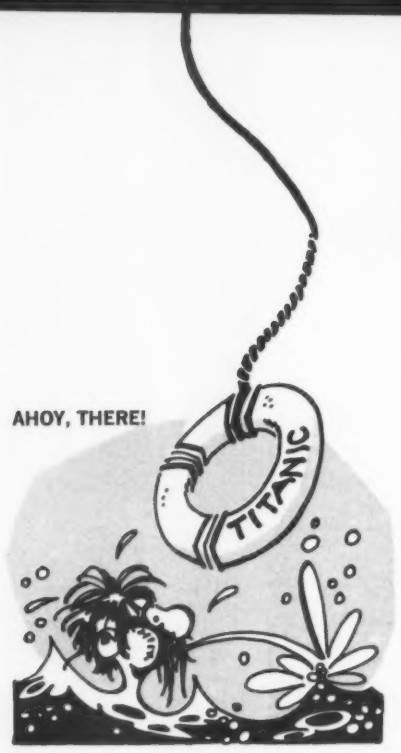
GROUNDS



BACKFIRE

Address your letters to:
Editor
DRIVER Magazine
AFISC/SEDD
Norton AFB CA 92409

AHOY, THERE!



In your article, "Anyone for Boating?", in the July issue, you have incorrectly stated the life preserver requirements. I rechecked with the Coast Guard before writing and the following requirements are in effect. For boats under 16 feet any approved type of flotation device is OK, and this includes wearable life preservers, life rings and flotation cushions. For boats 16 feet and over, a wearable life preserver is required for each occupant plus a throwable ring or cushion. This was a late change for 1974 and the Coast Guard admits to some confusion owing to the lateness of the change.

Your magazine is a highly readable publication and most enjoyable.

Commander Ted Morton
NAVWESA
Washington Navy Yard

I SEE HE SEES ME!

Your recent articles on motorcycle riding are great; however, you have a slip-up in part IV of "Getting Into It" (July). Concerning lane position, you say, "Finally, as long as you can see yourself in the outside mirror of the car you're following, you know you're not in his blind spot." In truth, if you can see yourself in the outside mirror, the mirror is badly adjusted and all the driver can see are the telephone poles along the left side of the road. In proper position, looking into a properly adjusted outside mirror, you should be able to see the driver of the car. Personally, I prefer that magic position from which you can look the driver in the eye in both the outside and inside mirrors. But even when riding in that position, I adhere to the "invisible at all times" philosophy that the article brings out. In other words, ride where the driver can see you twice, and then assume that he doesn't see you at all.

Capt Dennis J. Lenahan
Det 2, 14 Ms1WngSq
Mt. Hebo AFS, OR 97122

You're absolutely correct. We meant to say "rearview" and not "outside." Our thanks not only to Capt Lenahan but also to SSgt Scharf and LTJG Flowers for spotting our mistake.

SOMETIMES IT SNOWS

I was very interested in the two-part article, "Driving In and Around Seattle," having been stationed at McChord AFB for two years.

The article tells it like it is except for one thing. In the July segment, you say "there is very little snow in the McChord area." This is true, but when it does snow there the locals don't know how to drive in it! In the mountain areas the people know how to drive in it—they have to know! This is true of any area where you get snow in the winter. But in the Seattle-Tacoma area, they don't get much and when they do they just don't know how to drive.

We had snow several times while I was stationed there, although not much to speak of, but when I turned on the TV for the 11:00 PM news, it was nothing to hear about multi-car accidents on I-5 or somewhere that involved as many as 20 or 30 cars. When it snows, the drivers just don't adjust their speed. I drove in snow while I was there and I'd see them fly by me like I was standing still, then hit a patch of snow or ice and completely lose control.

However, that's the only drawback to the area. The people who live there are the nicest you will ever meet. And the area is a sportsman's paradise when it comes to hunting, fishing and beautiful scenery. McChord is an ideal assignment.

You have a good magazine. Keep up the good work!

SSgt Alan R. Koester
APO San Francisco 96328

LETTERS TO THE EDITOR

MORE IN WINTER

Sorry to be so far behind your publication schedule, but I don't see the magazine as soon as it comes out . I am writing in response to an article entitled "Following Distances" on page 17 of the April issue. The two-second rule is most effective in keeping a safe distance behind other vehicles, but you failed to mention its corollary for inclement weather—allow four seconds when streets are wet, and six when snowpacked or icy. I have found that this is far easier to remember and monitor than car lengths for the different road conditions . . .

Let me add my testimony to the many others you have received as to the value of your magazine. It seems to have information of value to everyone, regardless of their level of knowledge of automobiles. We appreciate your fine efforts.

Lt Glenn E. Anderson, Jr.
San Antonio, TX 78251

CHECKING SPEEDOMETERS

I enjoy your magazine in general and in particular I enjoyed a May article on expensive ways to calibrate your speedometer. May I suggest a cheaper method? Simply use the measured miles posted throughout the country. Indeed all speedometers are subject to some errors, but with an accurate watch, the measured mile is foolproof. You can do your own arithmetic if you like, but I include one sample case. At 55 mph a measured mile should take 65½ seconds to complete. If it takes your car more or less than 65½ seconds to travel one mile at 55 mph indicated, your speedometer is inaccurate about 9/10 of a mph for each second below or above 65½ seconds. Incidentally, you can recompute a correction factor by running another measured mile each time you change to snow tires or even change tire pressure.

Capt Joseph L. Faix
USAF Academy, CO 80840

TUNE-UP TIP

I refer to the general tune-up article in the July issue on installing and adjusting points used on nearly all non-GM car distributors. Adjusting the points by turning the engine over with the fan or by someone tapping the starter until the rubbing block is on the peak of a cam lobe and points open may not be the best method because:

(1) Most cars today have a plastic fan completely covered with a shroud, making it very difficult to get to and easy to break, and

(2) Using the buddy system when the fan is clutch-operated is also difficult, and continuous use of the starter may damage it.

Since the timing has to be checked for adjustment, the easiest and most professional way is to loosen the distributor shaft and turn it by hand until the rubbing block is on the peak of a cam lobe and then adjust the points. After the points are adjusted, turn the distributor shaft back to its original position and then check timing.

Overall, your article was very good with a lot of good tune-up tips.

SFC Billy Eubanks
USREDCOM (J4)
MacDill AFB, FL 33608

"Snapping" Bumpers

A serious safety hazard exists with some of the new energy absorbing bumpers on many of the 1973 and 1974 passenger cars. Some of these systems are essentially spring-loaded and a person attempting to disengage locked bumpers following a collision, or attempting to perform maintenance, can be seriously injured.

On minor impacts, the bumper normally will compress the shock absorber system and then release the bumper back to its original position. On strong impacts, the absorbing system will compress and can remain in this position. When a person pries or pulls on such a bumper, the compressed energy absorber system can release and shoot out like a spring-loaded ram.

Several police officers from a western city are minus fingers and another lost part of his foot from trying to separate vehicles equipped with these bumpers. Still another hazard exists if the vehicle is involved in an accident and fire results. The oil in the absorber system may explode from the heat and debris fly like a projectile.

About Miss DRIVER

(see page 13)

This is the third appearance in DRIVER for charm-school-instructor Cathy Madlin. Cathy is a busy young lady who also works as a photographer, artist and TV camera operator. At the controls is Dave Maza, a student well-known at Lake Arrowhead, California, for his skill as a water skiier.

Brakes

Automobile brakes are designed to give the driver early warning signals when maintenance, adjustments or repairs are needed. When you step on the brake pedal, you push brake fluid through tubes and hoses to the brakes at each wheel. The fluid pushes pistons which force the brake linings against a drum (or disc) attached to the wheel, retarding its rotation.

When service is needed, your brake pedal can tell you—if you know what to look for.

Short Pedal Travel: The surfaces of the linings and drums (or discs) may be riding too close to each other. Your emergency brake may be adjusted too tightly or the self-adjusting mechanism in one of your brakes may be malfunctioning.

Excessive Pedal Travel (or spongy pedal): Fluid for the brake system is stored in a master cylinder in the engine compartment. An inadequate fluid level can allow air to get into the brake system, causing the brake pedal to travel excessively (or feel spongy) and the brakes to operate inefficiently. Check for external leaks, add brake fluid and bleed the air out of the system.

Excessive pedal travel also can result if the linings of either the front or rear brakes are worn or are riding too far from the drum (or disc). Have the brakes adjusted or the linings replaced. Worn brake hoses that swell under hydraulic pressure also can cause excessive pedal travel and should be replaced.

Hard-to-push Pedal: A pedal that feels firm but gives little braking power when pressed usually indicates that your foot pressure is not being transmitted to the brakes. A binding pedal linkage, kinks or obstructions in the hydraulic hoses, a faulty power brake unit or low engine vacuum could be the problem.

Another possible cause is glazed brake linings that no longer grip. Brake linings should be inspected at least every 12,000 miles and, generally, replaced every 20,000.

Pulsating Pedal: If brake drums (rotors on disc brakes) are out of round, the linings, attempting to meet the uneven surface, can jiggle, transmitting a pulsating feeling through the pedal to your foot. Have the drums (rotors) inspected.

Pedal Goes to the Floor: The brake system has no fluid, the master cylinder has an internal leak or the pedal linkage is disconnected. Have the car towed to a garage.

Since 1968 all new vehicles sold in the United States have been equipped with dual brake systems. The front and rear brakes have entirely separate hydraulic systems. So, for example if your car's front brakes fail, the rear brakes still will stop the car. However, both front and rear systems must be maintained properly to insure adequate braking performance.

Optimum Gas Mileage

The 55-mph limit imposed by the federal government due to the energy shortage is not an arbitrary figure. It is based on the findings of a Department of Transportation study of gas consumption in relation to speed. The study showed that a typical 4,000-pound car travels 11.08 miles per gallon at 70 mph, 13.67 miles per gallon at 60 mph, 16.98 miles per gallon at 50 mph, and 14.89 miles per gallon at 40 mph. The study concluded that cars obtain the best gasoline mileage in the range of 50 to 55 mph and that speeds above **and below** that range reduce fuel economy.

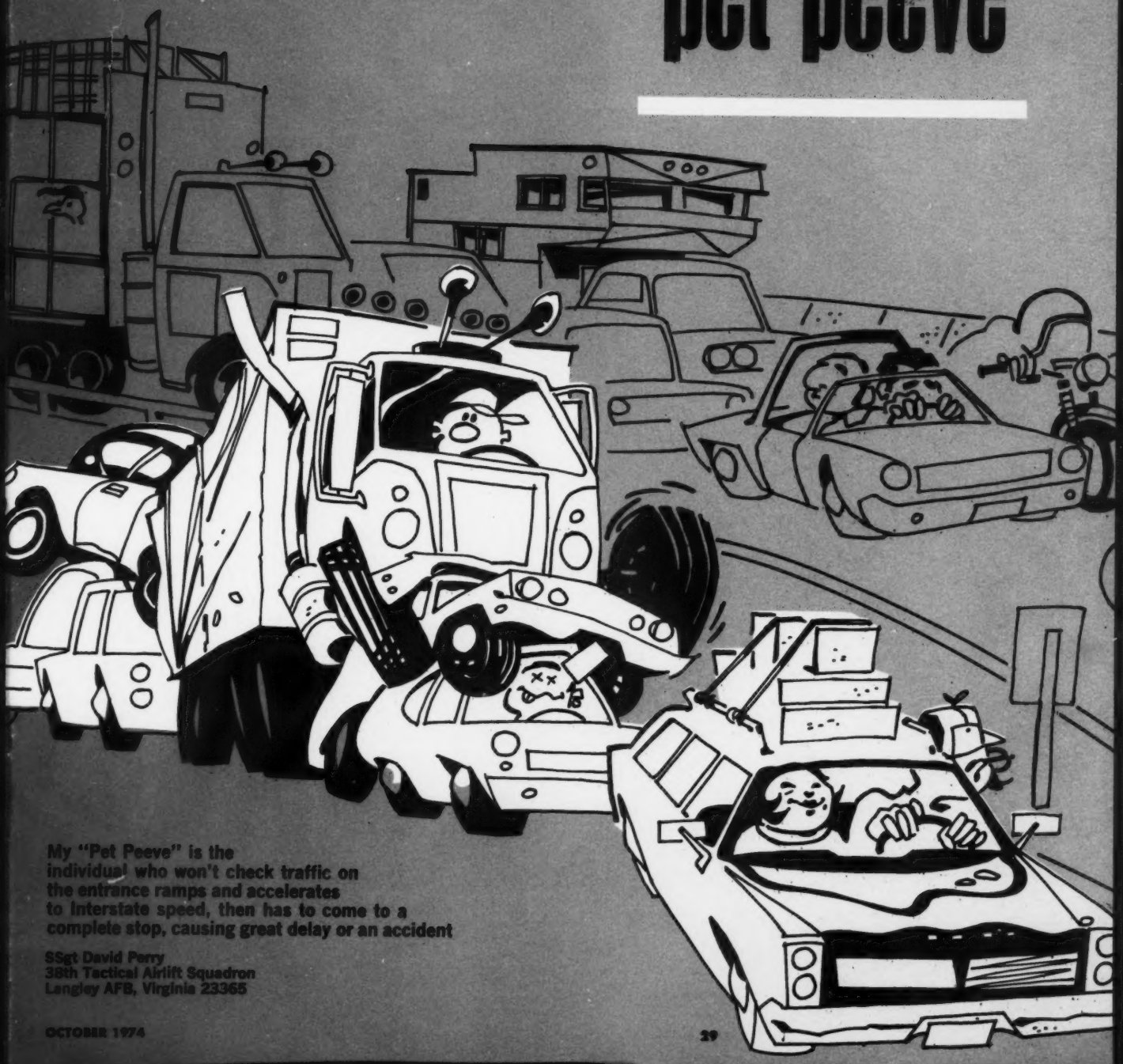
Answer to WHAT SHOULD YOU DO?"

(See back Cover before reading)

The answer is A. Maintain legal speed limit, signal, turn right as soon as possible and let him pass. It wouldn't do any good to slow down in this situation with traffic on both sides because he wouldn't have any place to go anyway and if you slow too much you could become a candidate for a ticket. Some drivers might flash their brake lights on and off to tell him he's too close but habitual tailgaters won't always respond to that. Above all, don't get annoyed enough to make a strong brake application. You're inviting a rear-end collision from a guy who's already shown he's not very smart.

☆U.S. GOVERNMENT PRINTING OFFICE: 1974—683-101/2

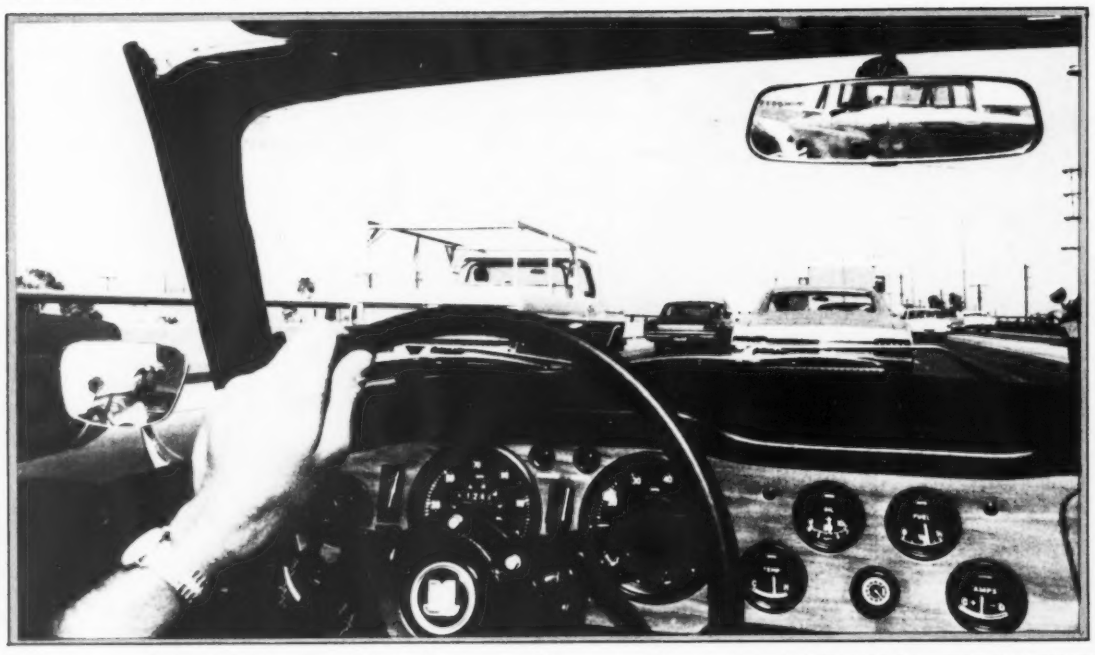
TUNEUP pet peeve

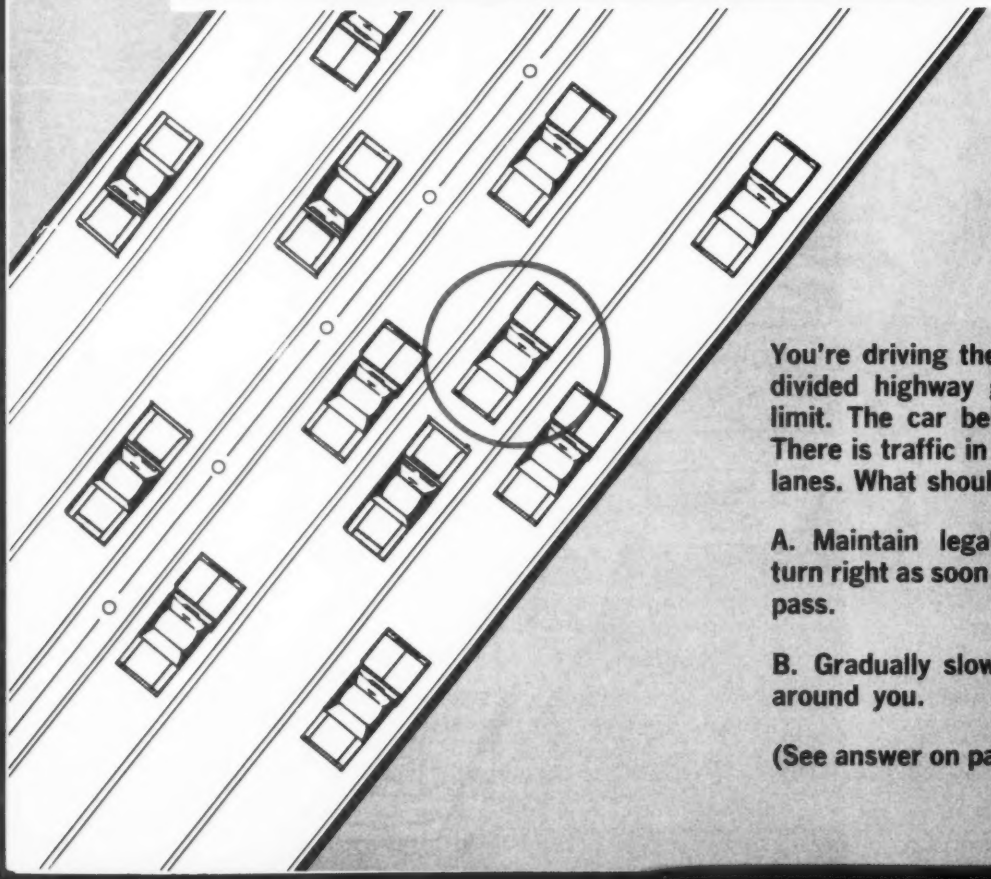


My "Pet Peeve" is the individual who won't check traffic on the entrance ramps and accelerates to interstate speed, then has to come to a complete stop, causing great delay or an accident

SSgt David Perry
38th Tactical Airlift Squadron
Langley AFB, Virginia 23365

What Should You Do?





You're driving the #2 lane of a six-lane divided highway going the legal speed limit. The car behind you is tailgating. There is traffic in both the right and left lanes. What should you do?

A. Maintain legal speed limit, signal, turn right as soon as possible and let him pass.

B. Gradually slow down and let him go around you.

(See answer on page 28)